THE INFLUENCE OF SNOW ON THE DEVELOPMENT OF VEGETATION IN SPRING.

By M. PEYRIGUEY JACQUES, in La Nature, April 17, 1920.

[Discussed by Katharine Davis.]

"Snow in February is worth as much as a fertilizer," is an old French peasant proverb. That there is some scientific basis for the belief is indicated by M. Peyriguey Jacques, assistant agricultural meteorologist, Montpellier, France, writing in La Nature, April 17, 1920.

He shows that from two standpoints a snow cover is valuable; (1) as a thermal blanket protecting soil and vegetation against freezes, and (2) for the supply of nitrogen compounds which is furnished to soil and plants by the melting snow.

(1) Investigating the problem of the effectiveness of protection by snow cover, M. Jacques made temperature records at Mont-Aigoual, Cevennes, southern France, with dry thermometers at depths of 0.1 m. and 0.2 m., respectively, in the snow and also at a height of 0.2 m. above the surface of the snow. The observations covered a period of 187 days during the winter and spring of 1916, when for 172 consecutive days the ground was snow covered. The accompanying table shows by decades the monthly mean temperatures of the snow and of the air during the months of February to April, inclusive, the May data not being given because the snow was constantly melting and its temperature remained at 0° C.

AT 0.2 M. ABOVE THE SNOW.

Periods.	February.	March.	April.
First decade	−4.6	−5.0	5.0
Second decade	−1.3	1.4	−0.4
Third decade	−2.8	1.3	7.0
Daily means	−2.9	−0.8	3.9

AT 0.1 M. IN THE SNOW.

First decade	−2.2	−4.1	0.0
Second decade	−1.1	−1.2	−0.5
Third decade	−2.3	−0.6	−0.1
Daily means	−1.8	−2.0	−0.2

AT 0.2 M. IN THE SNOW.

First decade	−2.2	−4.0	0.0
Second decade	−1.3	−1.2	−0.5
Third decade	−2.1	−0.4	−0.2
Daily means	−1.8	−1.8	−0.2

The table shows that there is no variation of the mean temperature of the thermal blanket at a depth of 0.2 m. during the months of February and March; that at 0.1 m. it is 0.2°, and that at 0.2 m. above the snow it is 2.1°. In April there is no variation during the first and third decades, and it is almost constant during the second decade. The temperature of the air, on the other hand, was decidedly variable during all of these periods.

Diagrams are included in the paper which show more graphically than can be done in tabular form that the air temperatures are much more variable than those of the snow, the range of these temperatures being as follows:

In the snow:		Above the snow:	
February	5.1°	February	11.5°
March	7.4°	March	10.4°
April	0.3°	April	21.8°

The figures show at a glance the efficiency of the thermal blanket afforded by the snow for the preservation of vegetation against freezing.

(2) To evaluate the quantities of nitric acid and of ammonia furnished to soil and vegetation by melting snow and rain, he uses figures obtained at the observatory at Mont-Souris, which agree with the data obtained at Mont-Aigoual, but which cover longer periods. He comments on the fact that snow contains nitric acid and ammonia in greater degree than rain does and also that soil and vegetation derive more benefit from these elements contained in snow as a greater amount is absorbed during the process of melting.

At the observatory of Mont-Souris it was found that the average quantity of nitric acid supplied by snow and rain during the years 1880 to 1894 was 400 milligrams per square meter per year, or 4 kilograms per hectare.

For the 20-year period from 1876 to 1895 the mean quantity of ammonia supplied by snow and rain was 1.086 grams per square meter per year, or 10.860 kilograms of ammonia per hectare, and, therefore, the soil at Mont-Souris was enriched, from an average depth of 551 mm. of melting snow and of rain per year, by a total of these nitrogen coupounds amounting to 14.860 kilograms per hectare.

Applying these figures, he finds that at Mont-Aigoual during a period of six months, December to May, inclusive, and for a depth of water of 1,621.7 mm., the soil was enriched by—

$$\frac{14.860 \times 1621.7}{551} = 43.736 \text{ kg.}$$

of nitrogen compounds per hectare, whose effects on the development of vegetation are therefore comparable to those of an average application of animal fertilizer.